

Synthesis of Studies in the Fall Low Salinity Zone of the San Francisco Estuary, September-December 2011

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More Authors

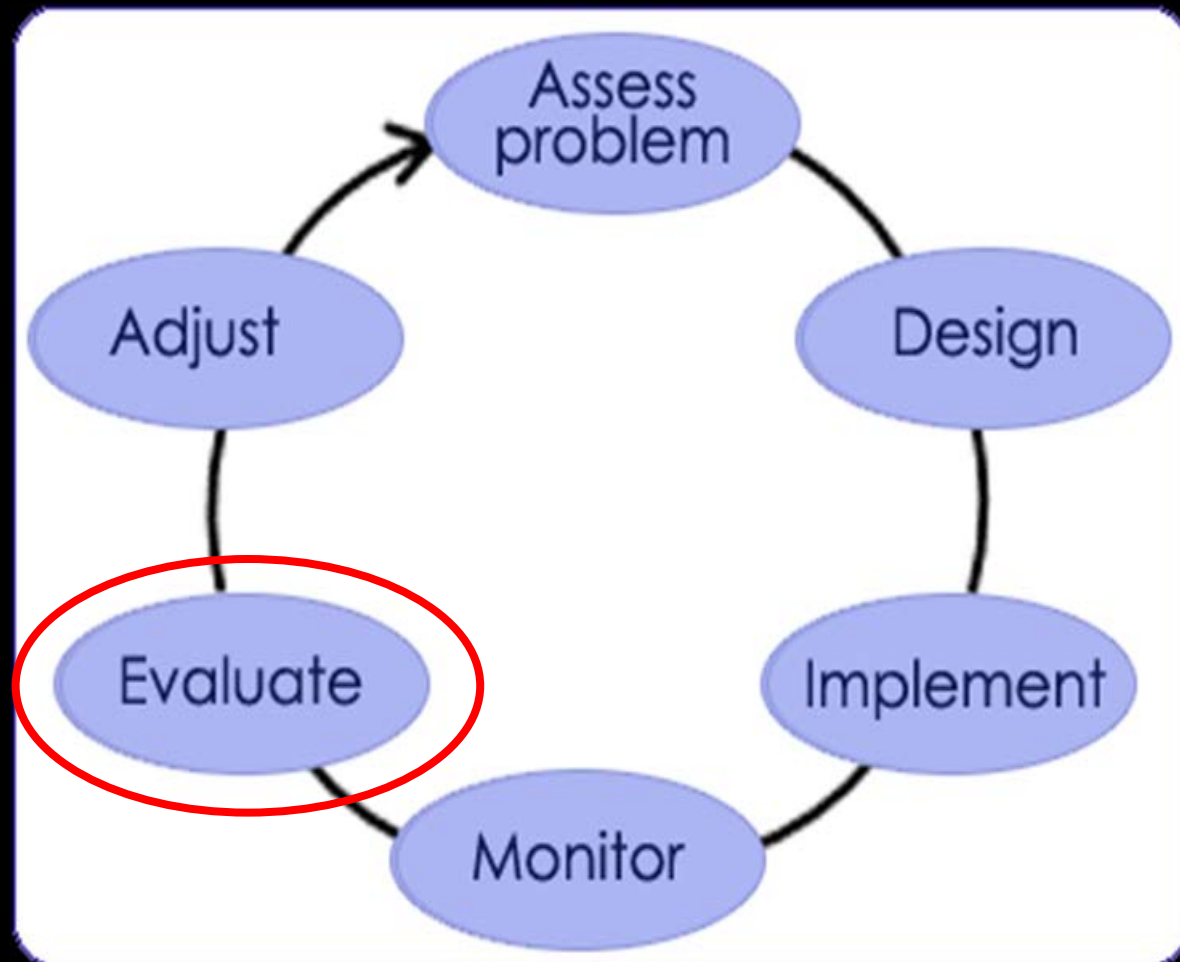
- USBR: Erwin Van Nieuwenhuyse, Frederick Feyrer, Lenny Grimaldo
- USFWS: Gonzalo Castillo, Steven Culberson, Joseph Kirsch
- USEPA: Bruce Herbold
- CDFG: Randy Baxter, Greg Erickson, Steve Slater, Kelly Souza (IEP Program Manager)
- CDWR: Louise Conrad, Karen Gehrts, Ted Sommer
- CVRWQCB: Stephanie Fong
- Delta Stewardship Council: Anke Mueller-Solger (IEP Lead Scientist)

Outline

- What is the report?
- How was it produced?
- What is in it and why?
 - Intro to PI presentations
- What is next?

What is it?

First report in AMP process



Technically

- USGS Scientific Investigations Report
 - Cooperators: Reclamation and IEP
 - Larry Brown, lead author and "editor"
 - must meet all USGS report review requirements
 - this panel is the USGS "colleague review" step

This is a draft!

PRELIMINARY, PREDECISIONAL, AND SUBJECT TO REVISION
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In Cooperation with the Bureau of Reclamation and Interagency Ecological Program

Synthesis of Studies in the Fall Low Salinity Zone of the San Francisco Estuary, September-December 2011

By Larry R. Brown, Randy Baxter, Gonzalo Castillo, Louise Conrad, Steven Culberson, Greg Erickson, Frederick Feyrer, Stephanie Fong, Karen Gehrts, Lenny Grimaldo, Bruce Herbold, Joseph Kirsch, Anke Mueller-Solger, Steve Slater, Ted Sommer, Kelly Souza, and Erwin Van Nieuwenhuysen

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Report Series XXXX-XXXX

U.S. Department of the Interior
U.S. Geological Survey

How was it produced?

Process

- mid-Feb: LB/USGS accepts assignment
- Meetings with PIs
 - January and April (IEP meeting)



Process

- Author meetings (FLaSH/MAST)
 - March and May
 - general approach and initial data evaluation
- Writing
 - March-June
 - May-June most data analysis



What is in it and why?

Content


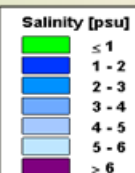

- Content decided in author meetings
- FLaSH is about the fall
 - concentrate on Sep-Dec (FMWT)
 - focus on Sep-Oct when flow managed
- The fall is not independent
 - consider previous seasons/months

Content

- Compare 2011 to what?
 - 2006, most recent wet year and no delta smelt response
 - North delta (Liberty Island/Cache Slough) vs LSZ
- Years are not independent
 - include 2005 and 2010 as antecedent years

Content

- FLaSH AMP organized around conceptual model

<i>Suisun Region</i>	Stationary Abiotic Habitat Components	<i>River Confluence</i>
<i>Higher</i>	Bathymetric Complexity	<i>Lower</i>
<i>Higher</i>	Erodible Sediment Supply	<i>Lower</i>
<i>Many in South, Fewer in North</i>	Contaminant Sources	<i>Many</i>
<i>Fewer</i>	Entrainment Sites	<i>More</i>
<i>Variable Fall Outflow Regime</i>	Dynamic Abiotic Habitat Components	<i>Static Fall Outflow Regime</i>
<i>Higher After Wet Springs</i>	Net Total Delta Fall Outflow	<i>Always Low</i>
<i>Higher After Wet Springs</i>	San Joaquin River Contribution to Fall Outflow	<i>Always Low</i>
<i>After Wet Springs, Broad Fall LSZ Overlaps Suisun Region</i> 	Location and Extent of the Fall LSZ (1-6 psu) 	<i>Narrow Fall LSZ In River Channels, Never Overlaps Suisun Region</i> 
<i>Higher After Wet Springs</i>	Hydrodynamic Complexity in the Fall LSZ	<i>Always Lower</i>
<i>Higher After Wet Springs</i>	Wind speed in the Fall LSZ	<i>Always Lower</i>
<i>More Variable, Higher After Wet Springs</i>	Turbidity in the Fall LSZ	<i>Always Less Variable, Lower</i>
<i>More Variable, Maybe Lower After Wet Springs</i>	Contaminant Concentrations in the Fall LSZ	<i>Less Variable, Maybe Higher</i>
<i>LSZ Overlaps Suisun Region</i>	Dynamic Biotic Habitat Components	<i>LSZ Overlaps River Confluence</i>
<i>Higher</i>	Food Availability and Quality	<i>Lower</i>
<i>Variable</i>	Predator Abundance	<i>Higher</i>
<i>LSZ Overlaps Suisun Region</i>	Delta Smelt Responses	<i>LSZ Overlaps River Confluence</i>
<i>Broad, Westward</i>	Distribution	<i>Constricted, Eastward</i>
<i>Higher</i>	Growth, Survival, Fecundity	<i>Lower</i>
<i>Better</i>	Health and Condition	<i>Worse</i>
<i>Maybe Higher</i>	Recruitment in the next Spring	<i>Lower</i>

Content

- FLaSH report should focus on
 - predictions
 - what didn't work
 - needs

Variable (Sep-Oct)	Predictions for X2 scenarios		
	85 km	81 km	74 km
Dynamic Abiotic Habitat Components			
Average Daily Net Delta Outflow	~5000 cfs?	~8000 cfs?	11400
Surface area of the fall LSZ	~ 4000 ha	~ 5000 ha	~ 9000 ha
Delta Smelt Abiotic Habitat Index	3523	4835	7261
San Joaquin River Contribution to Fall Outflow	0	Very Low	Low
Hydrodynamic Complexity in LSZ	Lower	Moderate	Higher
Average Wind Speed in the LSZ	Lower	Moderate	Higher
Average Turbidity in the LSZ	Lower	Moderate	Higher
Average Secchi Depth in the LSZ	Higher	Moderate	Lower
Average Ammonium Concentration in the LSZ	Higher	Moderate	Lower
Average Nitrate Concentration in the LSZ	Moderate	Moderate	Higher
Dynamic Biotic Habitat Components			
Average Phytoplankton Biomass in the LSZ (excluding Microcystis)	Lower	Moderate	Higher
Contribution of Diatoms to LSZ	Lower	Moderate	Higher
Phytoplankton Biomass			
Contribution of Other Algae to LSZ	Higher	Moderate	Lower
Phytoplankton biomass at X2			
Average Floating Microcystis Density in the LSZ	Higher	Moderate	Lower
Phytoplankton biomass variability across LSZ	Lower	Moderate	Higher
Calanoid copepod biomass in the LSZ	Lower	Moderate	Higher
Cyclopoid copepod biomass in the LSZ	Lower	Moderate	Moderate
Copepod biomass variability across LSZ	Lower	Moderate	Higher
<i>Potamocorbula</i> biomass in the LSZ	Higher	Moderate	Lower
Predator Abundance in the LSZ	Lower	Moderate	Higher
Predation Rates in the LSZ	Lower	Moderate	Higher
Delta Smelt (DS) Responses			
DS caught at Suisun power plants	0	0	Some
DS in fall SWP & CVP salvage	Some?	0	0
DS center of distribution (km)	85 (77-93)	82 (75-90)	78 (70-85)
DS growth, survival, and fecundity in fall	Lower	Moderate	Higher
DS health and condition in fall	Lower	Moderate	Higher
DS Recruitment the Next Year	Lower	Moderate	Higher
DS Population Life History Variability	Lower	Moderate	Higher

Content

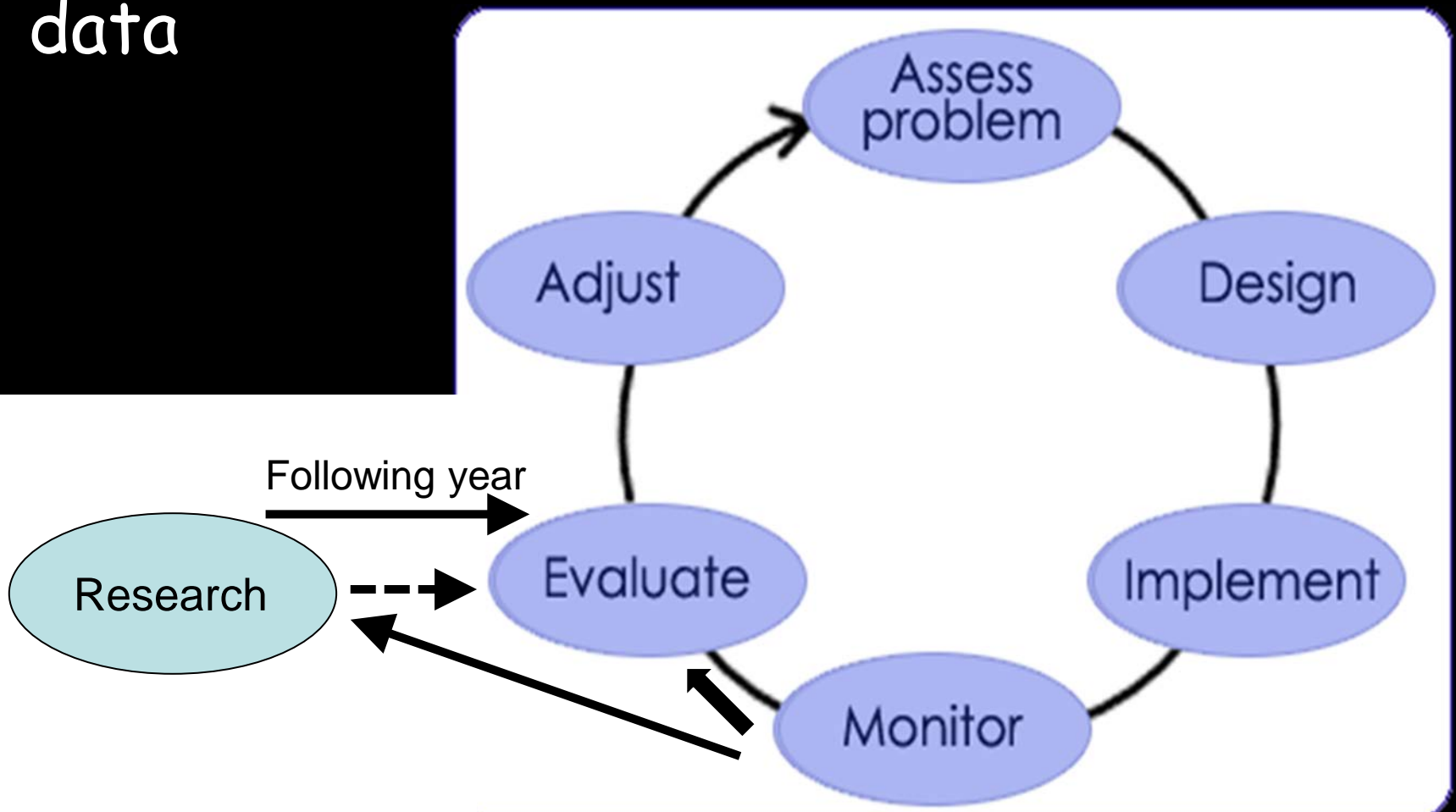
- Predictions and available data are not a precise match

Variable (Sep-Oct)	Predictions for X2 scenarios		
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Variable (Sep-Oct)	Predictions for X2 scenarios		
	85 km	81 km	74 km
	Year used to test prediction		
	2010	2005, 2006	2011
	(X2=85)	(X=83,82)	(X2=75)

Content

- Time line insufficient for incorporating data other than "standard" monitoring data



Content

- Brief review of report results
 - you have read the details
- PI presentations today
 - give you a flavor of new data/approaches
- Organized in accordance with conceptual model
 - Dynamic abiotic habitat components
 - Dynamic biotic habitat components
 - Delta smelt responses

Content

- Color key
 - yellow: there is a PI presentation
 - green: available data supports the prediction
 - red: available data does not support the prediction
 - grey: insufficient or contradictory data
 - no shading: no data

Content

- We have some understanding of the “physical environment” but not the details

Variable (Sep-Oct)	Predictions for X2 scenarios		
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Average Secchi Depth in the LSZ	Higher	Moderate	Lower
Average Ammonium Concentration in the LSZ	Higher	Moderate	Lower
Average Nitrate Concentration in the LSZ	Moderate	Moderate	Higher

Content

- Dynamic abiotic habitat components talks today
 - Monismith and Stacey: details of salinity and flow structure
 - Downing-Kunz and Schoellhamer: details of SSC analyses
 - Bergamaschi and Downing: water quality tool development
 - Kendall: chemistry comparisons

Content

- We still have a ways to go with ecological processes

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Calanoid copepod biomass in the LSZ	Lower	Moderate	Higher
Cyclopoid copepod biomass in the LSZ	Lower	Moderate	Moderate
Copepod biomass variability across LSZ	Lower	Moderate	Higher
<i>Corbula</i> biomass in the LSZ	Higher	Moderate	Lower
Predator Abundance in the LSZ	Lower	Moderate	Higher
Predation Rates in the LSZ	Lower	Moderate	Higher

Content

- These are all long standing issues in our estuary and others
- Dynamic biotic habitat components talks today
 - Parker: details of nutrient and phytoplankton distributions
 - Thompson: details on clam distribution and grazing
 - Miller and Stillman: details on *Potamocorbula* physiology

Content

- We have some tools to understand individual fish and the population
 - new tools being developed

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DS growth, survival, and fecundity in fall ^a	Lower	Moderate	Higher
DS health and condition in fall	Lower	Moderate	Higher
DS Recruitment the next year	Lower	Moderate	Higher
DS Population life history variability	Lower	Moderate	Higher

^a Only survival from summer to fall as the ratio of FMWT population index to TNS population index was assessed.

Content

- Delta smelt response talks today
 - Baxter and Slater: details of delta smelt distribution and diet
 - Teh: details on delta smelt health and reproduction

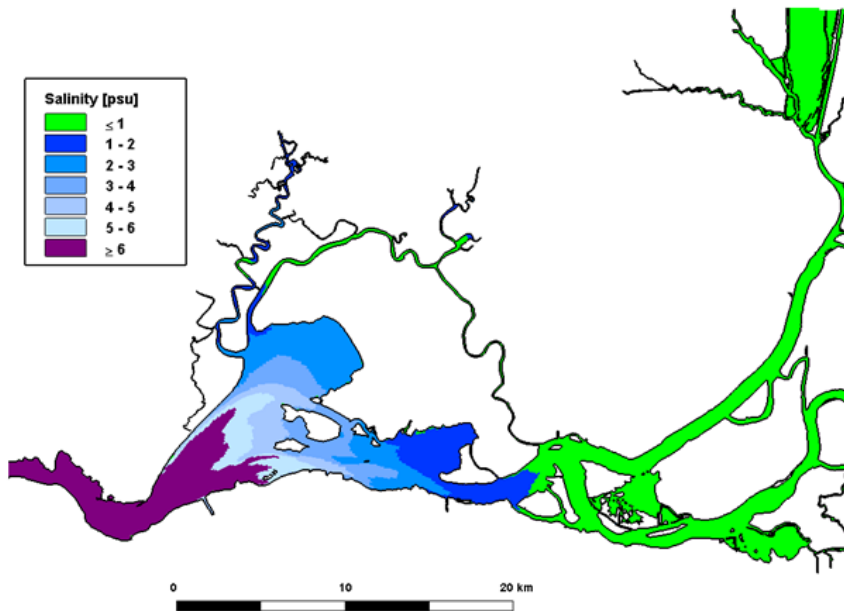
Content

- Science-based recommendations
 - Develop a method of measuring "hydrodynamic complexity"
 - Determine if a suspended sediment/turbidity model is desirable (wind speed)
 - Determine the correct spatial and temporal scale or scales for monitoring and other studies
 - Address the nutrient predictions as part of developing a phytoplankton production model if feasible.
 - Determine if studies of predation are feasible in areas where delta smelt occur

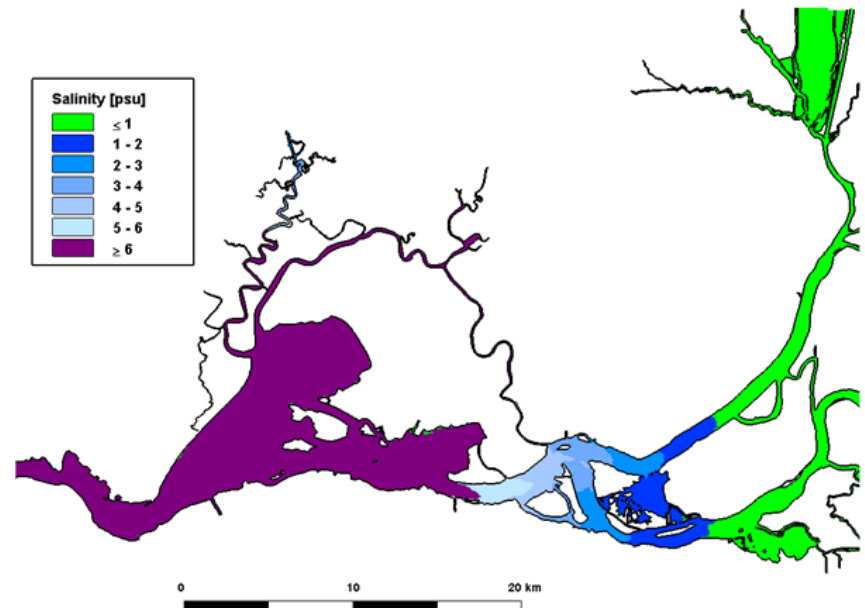
Content

- Science-based recommendations
 - Develop a method of measuring “hydrodynamic complexity”

Daily-Average Depth-Averaged Salinity

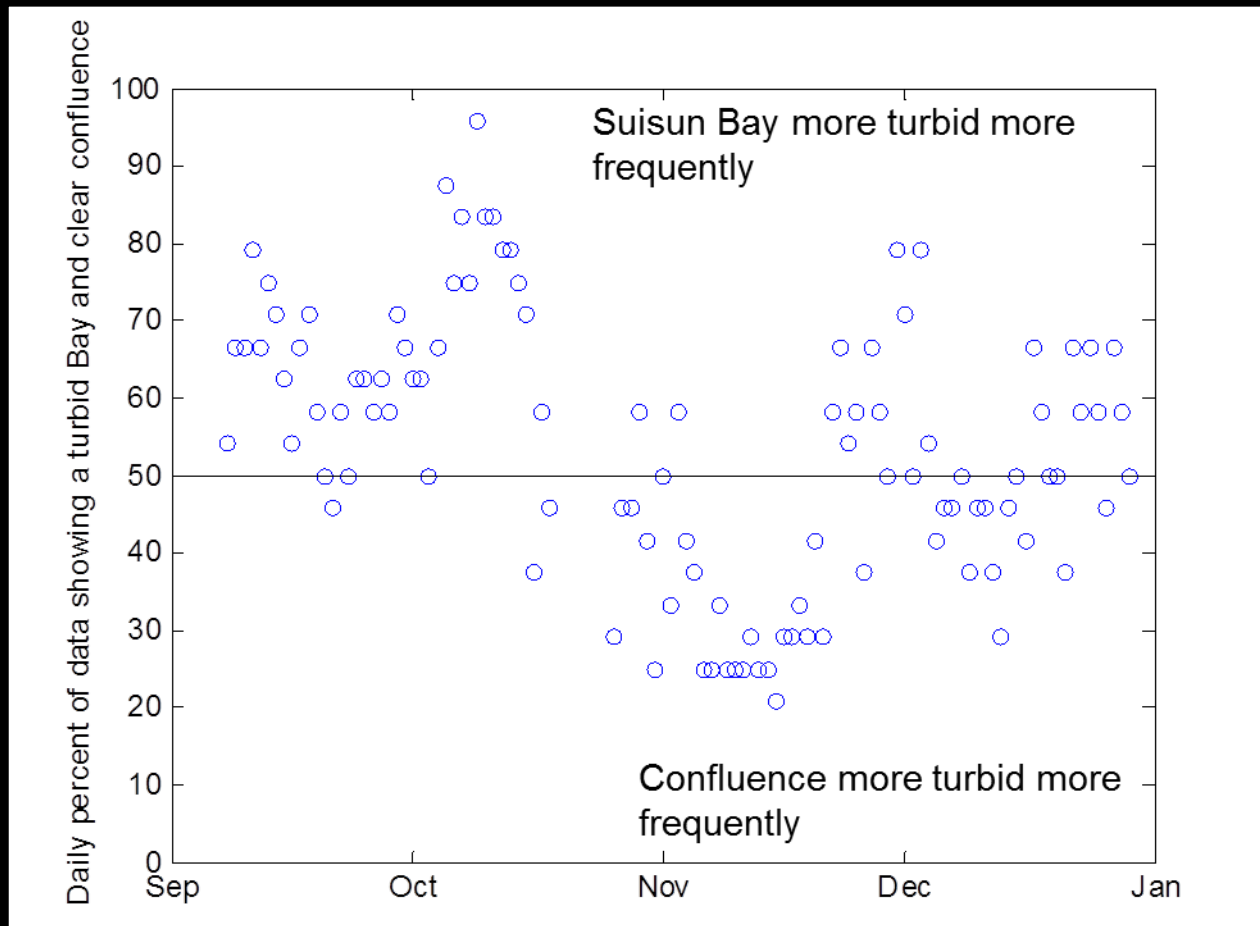


Daily-Average Depth-Averaged Salinity



Content

- Science-based recommendations
 - Determine if a suspended sediment/turbidity model is desirable (wind speed)

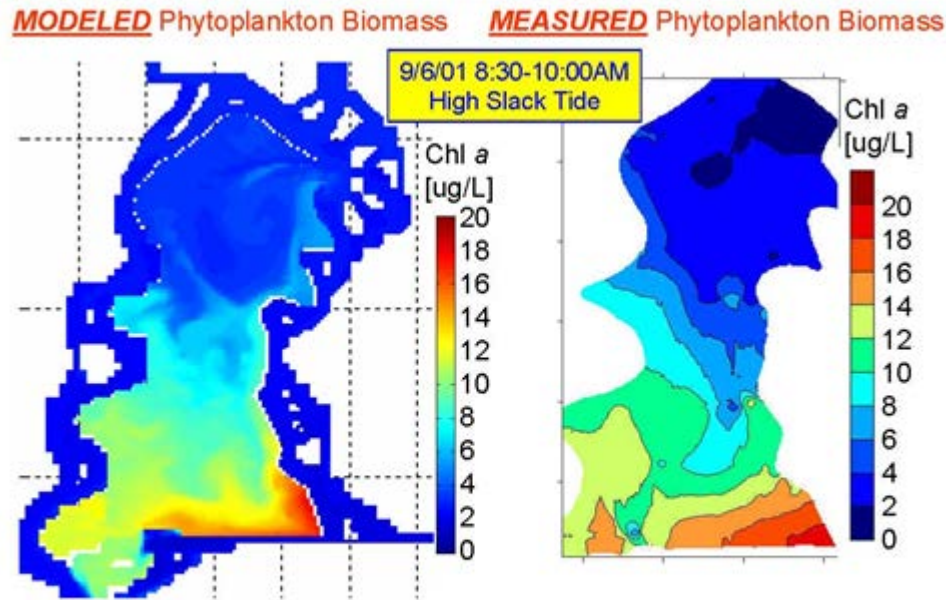


Content

- Science-based recommendations
 - Determine the correct spatial and temporal scale or scales for monitoring and other studies
 - Depends on the question...

Content

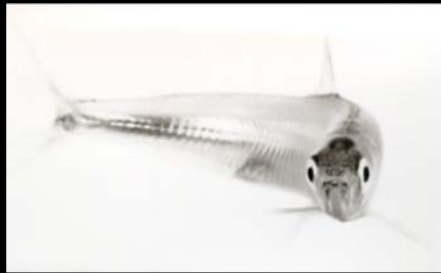
- Science-based recommendations
 - Address the nutrient predictions as part of developing a phytoplankton production model if feasible.



Regional 3D model of phytoplankton (as chl *a*), TRIM3D hydrodynamics, and water temperature in a Delta flooded island (Mildred Island), driven by measured grazing, turbidity, meteorology, tides [left], and measured chl *a* for the same time period [right]. (Lucas & Thompson (USGS), Baek & Stacey (UCB), unpub. data)

Content

- Science-based recommendations
 - Determine if studies of predation are feasible in areas where delta smelt occur



What is next?

- Respond to your review comments
- More comprehensive 2012 MAST report
- Monitoring/studies will continue
- Prepare for next wet year